REMARKS

This Application has been carefully reviewed in light of the Final Office Action. In order to advance prosecution of this case, Applicant amends Claims 40, 42, 43 and 47. Applicant cancels Claims 34-39, 41, 44-46 and 48-50, without prejudice or disclaimer. Applicant adds new Claims 51-64. Applicant respectfully requests reconsideration and favorable action in this case.

Claims 40, 42, 43 and 47 are amended and copied, verbatim, from the current version of claims in the '116 Application. Claims 51-64 are new claims that are copied verbatim from the '116 Application. The amendments, including new claims, are presented in furtherance of Applicant's request for Interference with the '116 Application.

Applicant believes that all claims of the '116 Application were allowed by Examiner Ferris, including claims that correspond, verbatim, to Claims 40, 42, 43, 47 and 51-64 of the present Application.

Applicant respectfully contends that it is improper to allow identical claims in the '116 Application, while maintaining grounds for rejection in the present Application, since many of the references used to reject claims of the present invention apply equally to the '116 Application, including all grounds of rejection that rely upon:

- U.S. Patent No. 6,213,225 to Chen
- U.S. Patent No. 6,412,577 to Chen
- *The Computer Simulation of the Interaction Between Roller Bit and Rock*, by MA
- *The Operational Mechanics of the Rock Bit*, by Ma
- U.S. Patent No. RE 34,435 to Warren et al.

Applicant respectfully contends that the present Application and the '116 Application must be consolidated with a single Examiner, in order to ensure fair and uniform treatment by the USPTO. At a minimum, Applicant respectfully requests that the respective Examiners of the present Application and the '116 Application should work together to ensure that each respective applicant is treated fairly and equally, with regard to the application of references in the rejection of claims.

Applicant respectfully contends, that if any of the pending claims of the present Application or the '116 Application are deemed allowable by the USPTO, such claims should be allowed in the present Application, and the present Application should be used in rejecting such claims in the '116 Application, in accordance with MPEP §2303, which states:

> Interferences will not be declared between pending applications if there is a difference of more than 3 months in the effective filing dates of the oldest and the next oldest applications, in the case of inventions of a simple character, or a difference of more than 6 months in the effective filing dates of the applications in other cases, except in exceptional situations, as determined and approved by the TC Director.

Applicant respectfully contends that the earliest effective filing date of the present Application (August 31, 1998) precedes the earliest effective filing date of the '116 Application (March 13, 2000) by more than six months. However, if the USPTO determines that this is an "exceptional situation" in accordance with MPEP §2303, Applicant respectfully requests that the USPTO declare Applicant as "senior party," and proceed to declare an Interference.

Thus, Applicant respectfully requests the following, of the USPTO:

(1) Prevent, revoke and/or withdraw issuance of the '116 Application, until the issues discussed herein are addressed by the USPTO in a fair and equal manner.

(2) If any Claims of the '116 Application and/or the present Application are determined to be patentable, that such claims be issued in the present Application, and that such issued patent be used to reject all corresponding Claims of the '116 Application.

(3) If the USPTO determines that this is an "exceptional circumstance" pursuant to MPEP §2302, and the USPTO refuses to grant allowable claims to Applicant without first conducting an Interference, Applicant respectfully requests that the USPTO declare an Interference between the present Application and the '116 Application, and declare Applicant the senior party in such Interference.

Examiner Interview Summary

On Thursday, August 19, 2004, Applicant's attorney, Luke K. Pedersen, conducted an Examiner Interview with Dr. Hugh Jones, regarding the present Application. Mr. Pedersen would like to express sincere gratitude to Dr. Jones for the time, consideration, and courtesy that Dr. Jones contributed to this meeting. Mr. Pedersen discussed the proposed amendment to the claims, with Dr. Jones. More specifically, Mr. Pedersen addressed the applicability of many of the rejections under 35 U.S.C. §112, to the proposed claim amendments. Mr. Pedersen also requested that the present Application and the '116 Application be consolidated with a single Examiner, to allow the parties to be treated fairly and equally, with regard to any rejections of identical claims, based upon alleged prior art.

Although no agreement was reached during the Examiner Interview, Applicant appreciates the valuable insight and consideration expressed by Dr. Jones at the meeting.

Applicant's compliance with 37 C.F.R. §1.604 with respect to Applicant's request that the Examiner declare an Interference between the present Application and the '116 Application, is indicated below:

I. 37 C.F.R. §1.604(a)(1)

Applicant proposes the following count:

> A method for designing a roller cone drill bit, comprising:
>
> simulating the bit drilling through an earth formation, wherein the simulating comprises obtaining an axial force on a cutting element, determining the axial force acting on each one of the roller cones, based on the axial forces acting on the cutting elements, and angularly rotating the bit;
>
> adjusting at least one design parameter of the bit;
>
> repeating the simulating the bit drilling; and
>
> comparing a distribution of axial forces acting on the roller cones prior to the adjusting with a distribution of axial forces acting on the roller cones after adjusting.

Claim 62 of the present Application corresponds exactly to the count.

II. 37 C.F.R. §1.604(a)(2)

Applicant respectfully requests that the Examiner declare an interference between the present Application and U.S. Patent Application No. 09/635,116. Claim 43 of the '116 Application corresponds exactly to the proposed count of Section I, above.

III. 37 C.F.R. §1.604(a)(3)

The Interference should be declared because, as shown by the table below, the present Application and the '116 Application claim the same invention.

The Present Application	The '116 Application
40. A method for designing a roller cone bit, comprising:	10. A method for designing a roller cone bit, comprising:
simulating the drill bit drilling through an earth formation, the simulating comprising:	simulating the drill bit drilling through an earth formation, the simulating comprising:
determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements,	determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements,
determining the axial force acting on each of the roller cones, based on the axial force acting on the cutting elements;	determining the axial force on each of the roller cones, based on the axial force acting on the cutting elements,
rotating the bit and redetermining the axial forces acting on each of the cutting elements;	rotating the bit and redetermining the axial forces acting on each of the cutting elements,
repeating the rotating and redetermining for a number of rotations; and	repeating the rotating and redetermining for a number of rotations, and
adjusting at least one bit design parameter, and repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter.	adjusting at least one bit design parameter, and repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter.
42. The method as defined in Claim 40 wherein adjusting comprises changing a number of cutting elements on at least one of the cones.	14. The method as defined in Claim 40 wherein adjusting comprises changing a number of cutting elements on at least one of the cones.
43. The method as defined in Claim 40 wherein adjusting comprises changing a location of cutting elements on at least one of the cones.	15. The method as defined in Claim 40 wherein adjusting comprises changing a location of cutting elements on at least one of the cones.
47. A method for designing a roller cone drill bit, comprising:	25. A method for designing a roller cone drill bit, comprising:
simulating the bit drilling through an earth formation wherein the simulating comprises determining an axial force on a cutting element, based on a means for determining an axial force, determining an axial force on the roller cones, based on the axial forces on the	simulating the bit drilling through an earth formation wherein the simulating comprises determining an axial force on a cutting element based on a means for determining an axial force, determining an axial force on the roller cones, based on the axial forces on the

cutting elements, and angularly rotating the bit;

adjusting at least one design parameter of the bit;

repeating the simulating the bit drilling; and

comparing a distribution of axial forces among the roller cones prior to the adjusting the at least one design parameter with a distribution of axial forces among the roller cones after adjusting the at least one design parameter.

51. The method of Claim 47, wherein the adjusting comprises changing an orientation of at least one cutting element.

52. The method of Claim 47, wherein a designer compares the distribution of axial forces.

53. The method of Claim 40, wherein adjusting comprises changing an orientation of at least one cutting element.

54. The method of Claim 40, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.

55. A method for designing a roller cone bit, comprising:

simulating the drill bit drilling through an earth formation, the simulating comprising:

obtaining an axial force acting on each of the cutting elements,

determining the axial force acting on each of the roller cones, based on the axial force acting on the cutting elements,

angularly rotating the bit and reobtaining the axial forces acting on each of the cutting elements, and repeating the rotating and reobtaining for a number of rotations; and

adjusting at least one bit design parameter, and

repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to

cutting elements, and angularly rotating the bit;

adjusting at least one design parameter of the bit;

repeating the simulating the bit drilling; and

comparing a distribution of axial forces among the roller cones prior to the adjusting the at least one design parameter with a distribution of axial forces among the roller cones after adjusting the at least one design parameter.

30. The method of Claim 47, wherein the adjusting comprises changing an orientation of at least one cutting element.

31. The method of Claim 47, wherein a designer compares the distribution of axial forces.

32. The method of Claim 40, wherein adjusting comprises changing an orientation of at least one cutting element.

33. The method of Claim 40, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.

34. A method for designing a roller cone bit, comprising:

simulating the drill bit drilling through an earth formation, the simulating comprising:

obtaining an axial force acting on each of the cutting elements,

determining the axial force acting on each of the roller cones, based on the axial force acting on the cutting elements,

angularly rotating the bit and reobtaining the axial forces acting on each of the cutting elements, and repeating the rotating and reobtaining for a number of rotations; and

adjusting at least one bit design parameter, and

repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to

adjusting the at least one bit design parameter.

56. The method of Claim 55, wherein adjusting comprises changing an orientation of at least one cutting element.

57. The method of Claim 55, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.

58. A method for designing a roller cone bit, comprising:

simulating the drill bit drilling through an earth formation, the simulating comprising determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements, and determining the axial force acting on each one of the roller cones, based on the axial force acting on the cutting elements, angularly rotating the bit and redetermining the axial forces acting on each of the cutting elements and redetermining the axial force acting on each one of the roller cones;

repeating the rotating and redetermining for a number of rotations; and

adjusting at least one bit design parameter, and

repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter.

59. The method of Claim 58, wherein adjusting comprises changing an orientation of at least one cutting element.

60. The method of Claim 58, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.

61. A method for designing a roller cone bit, comprising:

simulating the drill bit drilling through an earth formation, the simulating comprising:

obtaining an axial force acting on each of the cutting elements,

adjusting the at least one bit design parameter.

35. The method of Claim 56, wherein adjusting comprises changing an orientation of at least one cutting element.

36. The method of Claim 56, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.

38. A method for designing a roller cone bit, comprising:

simulating the drill bit drilling through an earth formation, the simulating comprising determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements, and determining the axial force acting on each one of the roller cones, based on the axial force acting on the cutting elements, angularly rotating the bit and redetermining the axial forces acting on each of the cutting elements and redetermining the axial force acting on each one of the roller cones;

repeating the rotating and redetermining for a number of rotations; and

adjusting at least one bit design parameter, and

repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter.

39. The method of Claim 60, wherein adjusting comprises changing an orientation of at least one cutting element.

40. The method of Claim 60, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.

42. A method for designing a roller cone bit, comprising:

simulating the drill bit drilling through an earth formation, the simulating comprising:

obtaining an axial force acting on each of the cutting elements,

obtaining the axial force acting on the cutting elements on each one of the roller cones, based on the axial forces acting on the cutting elements,	obtaining the axial force acting on the cutting elements on each one of the roller cones, based on the axial forces acting on the cutting elements,
angularly rotating the bit and reobtaining the axial forces acting on each of the cutting elements,	angularly rotating the bit and reobtaining the axial forces acting on each of the cutting elements,
repeating the rotating and reobtaining for a number of rotations, and	repeating the rotating and reobtaining for a number of rotations, and
adjusting at least one bit design parameter, and repeating the simulating and adjusting until a rate of penetration on the bit is increased in comparison to a first simulation of the drill bit.	adjusting at least one bit design parameter, and repeating the simulating and adjusting until a rate of penetration on the bit is increased in comparison to a first simulation of the drill bit.
62. A method for designing a roller cone drill bit, comprising:	43. A new method for designing a roller cone drill bit, comprising:
simulating the bit drilling through an earth formation, wherein the simulating comprises obtaining an axial force on a cutting element, determining the axial force acting on each one of the roller cones, based on the axial forces acting on the cutting elements, and angularly rotating the bit;	simulating the bit drilling through an earth formation, wherein the simulating comprises obtaining an axial force on a cutting element, determining the axial force acting on each one of the roller cones, based on the axial forces acting on the cutting elements, and angularly rotating the bit;
adjusting at least one design parameter of the bit;	adjusting at least one design parameter of the bit;
repeating the simulating the bit drilling; and	repeating the simulating the bit drilling; and
comparing a distribution of axial forces acting on the roller cones prior to the adjusting with a distribution of axial forces acting on the roller cones after adjusting.	comparing a distribution of axial forces acting on the roller cones prior to the adjusting with a distribution of axial forces acting on the roller cones after adjusting.
63. The method of Claim 62, wherein adjusting comprises changing an orientation of at least one cutting element.	44. The method of Claim 65, wherein adjusting comprises changing an orientation of at least one cutting element.
64. The method of Claim 62, wherein a designer compares the axial forces.	46. The method of Claim 65, wherein a designer compares the axial forces.

There are no differences between Claims 40, 42-43, 47, 51-64 of the present Application, and Claims 10, 14-15, 25, 30-36, 38-40, 42-44, and 46 of the '116 Application listed side-by-side above. Thus, it is clear that the parties are claiming the same patentable invention.

V. 37 C.F.R. §1.604(a)(5) SUPPORT FOR COPIED CLAIMS

Applicant respectfully contends that Claims 40, 42-43, 47, and 51-64 of the present Application are fully supported by the specification of the present Application, as originally filed. Applicant provides below, examples of specific portions of the specification that support specific claim limitations of Claims 40, 42-43, 47, and 51-64. Applicant does not intend this list to be exhaustive of all support for Claims 40, 42-43, 47, and 51-64 that is present in the specification of the present Application.

For the convenience of the Examiner, Applicant has reproduced specific portions of the specification of the present Application, in the attached Exhibit A. Such portions were reproduced from the cited "Support in the Specification", below, and are applied to their respective claim limitations in Exhibit A.

Claims	Support in the Specification
40. A method for designing a roller cone bit, comprising:	Page 16, line 11; Page 22, lines 1-3
simulating the drill bit drilling through an earth formation, the simulating comprising:	Page 14, line 6 to Page 15, line 3; Page 17, lines 26-27
determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements,	Page 13, lines 8-23; Page 14, lines 19-26; Page 22, lines 3-4
determining the axial force acting on each of the roller cones, based on the axial force acting on the cutting elements;	Page 14, lines 26-27; Page 22, lines 4-5
rotating the bit and redetermining the axial forces acting on each of the cutting elements;	Page 14, lines 19-25; Page 14, line 28 to Page 15, line 2; Page 22, lines 3-10
repeating the rotating and redetermining for a number of rotations; and	Page 14, lines 19-25; Page 14, line 28 to Page 15, line 2; Page 17, lines 26-27; Page 22, lines 3-10
adjusting at least one bit design parameter, and repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter.	Page 14, line 28 to Page 15, line 3; Page 19, lines 15-21; Page 22, lines 3-10
42. The method as defined in Claim 40 wherein	Page 16, lines 12-15; Page 17, lines 19-21

adjusting comprises changing a number of cutting elements on at least one of the cones.	
43. The method as defined in Claim 40 wherein adjusting comprises changing a location of cutting elements on at least one of the cones.	Page 16, lines 12-15
47. A method for designing a roller cone drill bit, comprising:	Page 16, line 11; Page 22, lines 1-3
simulating the bit drilling through an earth formation wherein the simulating comprises determining an axial force on a cutting element, based on a means for determining an axial force, determining an axial force on the roller cones, based on the axial forces on the cutting elements, and angularly rotating the bit;	Page 13, lines 8-23; Page 14, line 6 to Page 15, line 3; Page 17, lines 26-27; Page 22, lines 3-10
adjusting at least one design parameter of the bit;	Page 19, lines 15-21; Page 22, lines 7-8
repeating the simulating the bit drilling; and	Page 14, lines 19-25; Page 14, line 28 to Page 15, line 2; Page 17, lines 26-27; Page 22, lines 3-10
comparing a distribution of axial forces among the roller cones prior to the adjusting the at least one design parameter with a distribution of axial forces among the roller cones after adjusting the at least one design parameter.	Page 14, line 28 to Page 15, line 3; Page 19, lines 15-21; Page 22, lines 3-10
51. The method of Claim 47, wherein the adjusting comprises changing an orientation of at least one cutting element.	Page 16, lines 24-26
52. The method of Claim 47, wherein a designer compares the distribution of axial forces.	Page 11, lines 8-14
53. The method of Claim 40, wherein adjusting comprises changing an orientation of at least one cutting element.	Page 16, lines 24-26
54. The method of Claim 40, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.	Page 22, lines 3-10
55. A method for designing a roller cone bit, comprising:	Page 16, line 11; Page 22, lines 1-3
simulating the drill bit drilling through an earth formation, the simulating comprising:	Page 14, line 6 to Page 15, line 3; Page 17, lines 26-27
obtaining an axial force acting on each of the cutting elements,	Page 13, lines 8-23; Page 14, lines 19-26; Page 22, lines 3-4
determining the axial force acting on each of the roller cones, based on the axial force acting on the cutting elements,	Page 14, lines 26-27; Page 22, lines 4-5

angularly rotating the bit and reobtaining the axial forces acting on each of the cutting elements, and repeating the rotating and reobtaining for a number of rotations; and	Page 14, lines 19-25; Page 14, line 28 to Page 15, Line 2; Page 22, lines 3-10
adjusting at least one bit design parameter, and	Page 19, lines 15-21; Page 22, lines 7-8
repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one bit design parameter.	Page 14, line 28 to Page 15, Line 3; Page 19, lines 15-21; Page 22, lines 3-10
56. The method of Claim 55, wherein adjusting comprises changing an orientation of at least one cutting element.	Page 16, lines 24-26
57. The method of Claim 55, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.	Page 22, lines 3-10
58. A method for designing a roller cone bit, comprising:	Page 16, line 11; Page 22, lines 1-3
simulating the drill bit drilling through an earth formation, the simulating comprising determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements, and determining the axial force acting on each one of the roller cones, based on the axial force acting on the cutting elements, angularly rotating the bit and redetermining the axial forces acting on each of the cutting elements and redetermining the axial force acting on each one of the roller cones;	Page 13, lines 8-23; Page 14, line 6 to Page 15, Line 3; Page 17, lines 26-27; Page 22, lines 3-10
repeating the rotating and redetermining for a number of rotations; and	Page 14, lines 19-25; Page 14, line 28 to Page 15, Line 2; Page 17, lines 26-27; Page 22, lines 3-10
adjusting at least one bit design parameter, and	Page 19, lines 15-21; Page 22, lines 7-8
repeating the simulating and adjusting until a difference between the axial force on each one of the roller cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter.	Page 14, line 28 to Page 15, Line 3; Page 19, lines 15-21; Page 22, lines 3-10
59. The method of Claim 58, wherein adjusting comprises changing an orientation of at least one cutting element.	Page 16, lines 24-26
60. The method of Claim 58, wherein the adjusting and the repeating are continued until a distribution of axial force is substantially balanced between the roller cones.	Page 22, lines 3-10
61. A method for designing a roller cone bit, comprising:	Page 16, line 11; Page 22, lines 1-3

simulating the drill bit drilling through an earth formation, the simulating comprising:	Page 14, line 6 to Page 15, Line 3; Page 17, lines 26-27
obtaining an axial force acting on each of the cutting elements,	Page 13, lines 8-23; Page 14, lines 19-26; Page 22, lines 3-4
obtaining the axial force acting on the cutting elements on each one of the roller cones, based on the axial forces acting on the cutting elements,	Page 14, lines 26-27; Page 22, lines 4-5
angularly rotating the bit and reobtaining the axial forces acting on each of the cutting elements,	Page 14, lines 19-25; Page 14, line 28 to Page 15, Line 2; Page 22, lines 3-10
repeating the rotating and reobtaining for a number of rotations, and	Page 14, lines 19-25; Page 14, line 28 to Page 15, Line 2; Page 17, lines 26-27; Page 22, lines 3-10
adjusting at least one bit design parameter, and repeating the simulating and adjusting until a rate of penetration on the bit is increased in comparison to a first simulation of the drill bit.	Page 14, line 28 to Page 15, Line 3; Page 19, lines 15-21; Page 22, lines 3-10; Page 6, lines 10-14; Page 11, lines 19-28 (Incorporating by reference text of U.S. Patent Number 6,095,262, Column 9, Lines 53-60)
62. A method for designing a roller cone drill bit, comprising:	Page 16, line 11; Page 22, lines 1-3
simulating the bit drilling through an earth formation, wherein the simulating comprises obtaining an axial force on a cutting element, determining the axial force acting on each one of the roller cones, based on the axial forces acting on the cutting elements, and angularly rotating the bit;	Page 13, lines 8-23; Page 14, line 6 to Page 15, Line 3; Page 17, lines 26-27; Page 22, lines 3-10
adjusting at least one design parameter of the bit;	Page 19, lines 15-21; Page 22, lines 7-8
repeating the simulating the bit drilling; and	Page 14, lines 19-25; Page 14, line 28 to Page 15, Line 2; Page 17, lines 26-27; Page 22, lines 3-10
comparing a distribution of axial forces acting on the roller cones prior to the adjusting with a distribution of axial forces acting on the roller cones after adjusting.	Page 14, line 28 to Page 15, Line 3; Page 19, lines 15-21; Page 22, lines 3-10
63. The method of Claim 62, wherein adjusting comprises changing an orientation of at least one cutting element.	Page 16, lines 24-26
64. The method of Claim 62, wherein a designer compares the axial forces.	Page 11, lines 8-14

VI. REQUEST FOR THE BENEFIT OF THE FILING DATES OF APPLICANT'S PRIORITY APPLICATIONS

Applicant claims priority under 35 USC 120 based upon U.S. Patent Application Serial No. 09/387,737 (the "'737" Application), filed August 31, 1999, now U.S. Patent No. 6,213,225, which claims priority under 35 USC 119(e) based on provisional application No. 60/098,466 filed August 31, 1998. The present Application is a continuation of the '737 Application. Applicant is entitled to the benefit of the filing dates of his earlier filed applications for interference purposes if the count reads on at least one adequately disclosed embodiment in the earlier application.[1]

[1] Weil v. Fritz, 572 F.2d 856, 865-66 n.16, 196 USPQ 600, 608 n.16 (CCPA 1978).

Objection to the Drawings

The Office Action objected to the drawings and required that Figures 10-12 be designated by a legend such as "Prior Art". Applicant includes with this Response proposed revisions to page "8 of 8" of the drawings in which Figures 10-12 have been labeled as "Prior Art" (see Exhibit B attached), for approval by the Examiner. Thus, Figures 10-12 have been labeled "Prior Art", as required by the Office Action.

Claim Objections

The Office Action objected to the claim numbering of dependent claims and alleges that such numbering is not in accordance with 37 C.F.R. §1.126. Specifically, the Office Action indicates that dependent Claims 37- 39 and 41-45 depend from cancelled claims. Claims 37-39, 41 and 44-45 have been cancelled, without prejudice or disclaimer. Claims 42 and 43 have been amended to depend from Claim 40, as required by the Office Action.

The Office Action objected to Claim 35 for informalities. Claim 35 has been canceled, rending this objection moot.

Information Disclosure Statement

The Office Action requested copies of the following references:

- ***Applied Drilling:*** Bourgoyne et al.;
- ***Oil and Gas Field Development Techniques: Drilling:*** Nguyen;
- ***Making Hole:*** Kirkley;
- ***Drilling Mud:*** Kirkley;
- ***Wave Propagation in Petroleum Engineering:*** Chin;
- ***Experimental Evaluations of Drill String Dynamics:*** Dykstra et al.; and
- ***Penetration Problems in Rock Mechanics:*** Sikarskie et al.

Applicant includes with this Response an Information Disclosure Statement, filed July 16, 2004, and a return receipt postcard indicating receipt of the Information Disclosure Statement by the U.S. Patent and Trademark Office on July 16, 2004 (See Exhibit C attached). Applicant also attaches courtesy copies of the references requested by the Office Action, for use by the Examiner.

Requirement for Information

The Office Action requests, Pursuant to 37 C.F.R. §1.105, information regarding "related Litigation." *See Office Action*, Requirement for Information, page 2, ¶3. In response, Applicant submits a Final Judgment regarding Civil Action No. 4:02CV269 (See Exhibit E attached).

Section 112 Rejections

The Office Action rejects Claims 34-40 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement. More Specifically, the Office Action alleges that the "specification does not disclose substantial detail relating to the simulation or optimization, other than to define variables which are to be simulated. *See Office Action,* page 5, ¶ 13. Applicant respectfully traverses these rejections for the reasons stated below.

Claims 35-39 have been cancelled without prejudice or disclaimer. Applicant respectfully contends that Claim 40 fully complies with the requirements of 35 U.S.C. §112, first paragraph.

Claim 40 is directed to a method for designing a roller-cone bit that includes the limitations "simulating the drill bit drilling through an earth formation ...determining [an] axial force acting on each of the roller-cones, based on the axial force acting on the cutting elements ... and adjusting at least one bit design parameter, and repeating the simulating and adjusting until a difference between the axial force on each of the roller-cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter." Thus, the only limitation that uses the term "simulating" or "optimizing" is the limitation "simulating the drill bit drilling through an earth formation." This limitation is fully enabled by the specification of the present Application.

According to Claim 40, "simulating" comprises "determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements" and, "determining the axial force acting on each of the roller-cones, based on the axial force acting on the cutting elements." The present Application, at page 13, line 5-page 15, line 3, describe the equations and manner in which the axial force acting on each of the cutting elements may be determined.

Furthermore, the present application is a continuation of U.S. Patent No. 6,213,225 (the "'*225 Patent*"). The *'225 Patent* includes claims directed to methods for designing roller-cone drill bits that include limitations such as "calculating the axial force acting on each tooth on each cutting structure ... calculating the axial force acting on each

cutting structure per revolution of the drill bit ...". *See the '225 Patent*, Claim 8. Since the *'225 Patent* was issued by the U.S. Patent and Trademark Office ("USPTO"), the claims of the *'225 Patent* are presumed valid. *See 35 U.S.C. §282.* Furthermore, since the issued claims of the *'225 Patent* include limitations regarding calculating the axial force acting on each tooth, the presumption of validity implies that such limitations are enabled by the specification of the *'225 Patent*, which is the identical specification of the present Application. *Id.* Applicant respectfully contends that the limitations of Claim 40 regarding "simulating the drill bit drilling through an earth formation" are enabled for the same reasons that the limitations of Claim 8 of the *'225 Patent* are enabled.

The Office Action rejects Claims 34-35, 38-39, 44-45 and 50 under 35 U.S.C. § 112, first paragraph, and alleges that the specification, while being enabling for calculating the volume of a crater, does not reasonably provide enablement for calculating any other crater parameter. Applicant respectfully traverses these rejections.

However, Claims 34-35, 38-39, 44-45 and 50 have each been canceled without prejudice or disclaimer. Therefore, these rejections under 35 U.S.C. §112, first paragraph are rendered moot.

The Office Action rejects Claims 34-50 under 35 U.S.C. § 112, first paragraph, and alleges that the specification, while being enabling for a bit with three roller cones, does not reasonably provide enablement for a bit with any other number of roller cones. Applicant respectfully traverses these rejections for the reasons stated below.

Claims 34-39, 41, 44-46, and 48-50 have been canceled without prejudice or disclaimer. Furthermore, none of Claims 40, 42-43 or 47 specifically claim a bit with any specific number of roller-cones. Instead, the claims refer to roller-cones, without specifying the number. For at least these reasons, Applicant respectfully contends that the rejection of Claims 40, 42-43 and 47 under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement is improper.

Furthermore, the Office Action readily admits that the present Application is enabled for the illustrated embodiment, of 3 roller-cones. *See Office Action,* page 6, ¶ 15.

Applicant respectfully submits that this is sufficiently enabling for a person have ordinary skill in the art to use the teachings of the present invention, without undue experimentation.

Moreover, the Office Action cites many ranges and aspects of the illustrated embodiment and alleges that the ranges and aspects are not applicable to a drill bit having more or fewer than three roller cones. Applicant respectfully contends that the present invention is described with regard to three roller cones and that a person of ordinary skill in the art could apply such teaching to a drill bit having a different number of roller cones, without undue experimentation.

As discussed above, the present Application is a Continuation Application of the '225 Patent. Applicant notes that the '225 Patent includes claims to a roller-cone bit that includes "a plurality of arms" and "rotatable cutting structures mounted on respective ones of said arms." *See '225 Patent, Claim 1.* Since Claim 1 of the '225 Patent was issued by the USPTO, Claim 1 is presumed valid, and therefore presumed enabled. *See 35 U.S.C. §282.* Applicant respectfully submits that the present Application is enabled for any number of roller-cones greater than one, for the same reasons that Claim 1 of the '225 Patent is enabled for a "plurality" of cutting structures.

The Office Action rejects Claims 35 and 40-45 under 35 U.S.C. § 112, second paragraph, as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More specifically, the Office Action contends that "the last limitation of the independent claims are ambiguous and are not understood." *See Office Action*, page 7, ¶ 17. Applicant respectfully traverses these rejections for the reasons stated below.

Claims 35, 41 and 44-45 have each been canceled, without prejudice or disclaimer. Thus, the only claims that remain that are subject to this rejection are Claims 40 and 42-43. Applicant respectfully contends that each such claim meets all the requirements of 35 U.S.C. §112, second paragraph, and particularly points and distinctly claims the subject matter which Applicant regards as the invention.

The only example provided by the Office Action regarding the merits of this rejection is related exclusively to Claim 35, which has been canceled. Moreover, Applicant is unsure which limitation(s) of Claims 40, 42 and/or 43 are subject to this rejection. Applicant respectfully contends that the last limitation of Claim 40 particularly points out and distinctly claims the subject matter which Applicant regards as the invention.

Applicant notes that Claims 40, and 42-43 have each been copied, verbatim, from the '116 Application. Moreover, each of the corresponding claims in the '116 Application have been allowed by the USPTO. Applicant respectfully contends that such a limitation cannot be ambiguous with respect to one application, and yet allowable in another, co-pending application. For at least these reasons, Applicant respectfully contends that Claims 40 and 42-43 each comply fully with the requirements of 35 U.S.C. §112, second paragraph.

The Office Action rejects Claims 34-50 under 35 U.S.C. § 112, second paragraph, as allegedly being incomplete for omitting essential steps. Applicant respectfully traverses these rejections for the reasons stated below.

Claims 34-39, 41, 44-46 and 48-50 have been cancelled without prejudice or disclaimer. Thus, this rejection only applies to pending Claims 40, 42, 43 and 47.

With regard to Claims 40, 42 and 43, the Office Action contends that "the essential steps in obtaining the axial force or balancing of the axial force are not claimed." *See Office Action, page 8.* Applicant respectfully contends that this rejection is moot, since amended Claim 40 concludes limitations directed to determining axial force.

With regard to Claim 47, the Office Action contends that "simulation is central to Applicant's invention. However, the essential steps in this simulation are not claimed." *See Office Action,* page 8. Applicant respectfully contends that this rejection is moot, since amended Claim 47 includes limitations directed to simulating the bit drilling through an earth formation.

With regard to Claim 47, the Office Action contends that "the necessary and essential details relating to how the optimization is achieved are not claimed" and "the criterion for optimization has been claimed-thus rendering the claim indefinite." *See Office Action,* page 8. Applicant respectfully traverses these rejections, for the reasons discussed below.

A rejection under 35 U.S.C. §112, second paragraph, for omitting essential steps is proper if the claim "omits matter disclosed to be essential to the invention as described in the specification or in other statements of record." *See MPEP §2172.01*, citing *In re Mayhew,* 527 F.2d 1229. The Office Action fails to provide any support for the contention that any omitted steps were "disclosed to be essential to the invention as described in the specification or in other statements of record", as required to support a rejection under 35 U.S.C. §112, second paragraph. Applicant respectfully contends that the claims do not omit any "essential steps." If the Examiner intends to maintain this rejection, Applicants respectfully request that the Examiner cite the specific portion of the specification or other statements of record, in which Applicant allegedly disclosed any omitted steps to be essential to the invention.

The Office Action alleges that the term "substantially" in Claims 48-49 "is a relative term which renders the claim indefinite." *See Office Action,* page 9. Claims 48 and 49 have been cancelled without prejudice or disclaimer, rending this rejection moot.

Double Patenting

Claims 34-50 are rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 1-12 of U.S. Patent No. 6,213,225 issued to Chen (the "*'225 Patent*"). Claims 34-50 are rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 1-6 of U.S. Patent No. 6,412,577 issued to Chen (the "*'577 Patent*"). Applicant respectfully traverses these rejections for the reasons stated below.

The Examiner indicates that timely filed terminal disclaimers in compliance with 37 C.F.R. 1.321(c) may be used to overcome these rejections. Without conceding the veracity of the Examiner's rejections under the judicially created doctrine of obviousness-type double patenting, and solely for the purpose of advancing prosecution of this case, Applicant files herewith Terminal Disclaimers (See Exhibit D attached) to overcome the double patenting rejections.

Section 102 Rejections

The Office Action rejects Claims 34, 36-39, 46 and 50 under 35 U.S.C. §102(b) as being anticipated by *Ma et al.* ("The Computer Simulation of the Interaction Between Roller Bit and Rock", 1995 - of record) or *Ma* ("The Operational Mechanics of the Rock Bit", 1995 - of record). Applicant respectfully traverses these rejections for the reasons stated below.

Claims 34, 36-39, 46 and 50 have been cancelled without prejudice or disclaimer, rendering these rejections moot.

Section 103 Rejections

The Office Action rejects Claims 35, 40-45, and 47-49 under 35 U.S.C. §103(a) as being unpatentable over *Ma et al.* or *Ma* in view of U.S. Reissue Patent No. RE 34,435 issued to Warren et al ("*Warren*") and in further view of *Applicant's Own Admission*. Applicant respectfully traverses these rejections for the reasons stated below.

Claims 35, 41, 44, 45, 48 and 49 have been cancelled without prejudice or disclaimer, rendering those rejections moot, with regard to such claims. Claims 40, 42, 43 and 47 remain pending.

Applicant notes that identical claims to Claims 40, 42, 43 and 47 were allowed by Examiner Ferris, in the '116 Application. Thus, Applicant respectfully contends that the USPTO has already determined that Claims 40, 42, 43 and 47 are patentable. Applicant respectfully requests that Applicant must be treated fairly and equally, with regard to the present Application and the '116 Application.

Claim 40 is directed to a method for designing a roller-cone bit that includes simulating the drill bit drilling through an earth formation. The method includes determining, based on a means for determining an axial force, an axial force acting on each of the cutting elements. The method further includes determining the axial force acting on each of the roller-cones, based on the axial force acting on the cutting elements, rotating the bit and redetermining the axial forces acting on each of the cutting elements, and repeating the rotating and determining for a number of rotations. At least one bit design parameter is adjusted and the simulating and adjusting is repeated until a difference between the axial force on each one of the roller-cones is less than a difference between the axial force determined prior to adjusting the at least one initial design parameter. Applicant respectfully contends that neither *Ma*, *Ma et al.*, *Warren,* nor Applicant's Own Admission, either alone or in combination, disclose, teach, or suggest each of these limitations.

More specifically, the portions of the references relied upon by the Office Action do not disclose, teach, or suggest "determining the axial force acting on each of the roller-cones, based on the axial force acting on the cutting elements", and "adjusting at least one bit design parameter, and repeating the simulating and adjusting until a difference

between the axial force on each one of the roller-cones is less than a difference between the axial force determined prior to adjusting the at least initial design parameter" as required by Claim 40. For at least these reasons, Applicant respectfully contends that Claim 40 is patentably distinguishable from the references relied upon by the Office Action.

Claims 42 and 43 each depend from Claim 40. Therefore, Applicant respectfully contends that Claims 42 and 43 are patentably distinguishable from the references relied upon by the Office Action for example, for the same reasons discussed above with regard to Claim 40.

Claims 47 is directed to a method a designing a roller-cone bit that includes simulating the bit drilling through an earth formation. The simulating comprises determining an axial force on a cutting element, based on a means for determining an axial force, determining an axial force on the roller-cones, based on the axial forces on the cutting elements, and angularly rotating the bit. At least one bit design parameter is adjusted and the simulating the bit drilling is repeated. A distribution of axial forces among the roller-cones prior to the adjusting the at least one design parameter is compared with a distribution of axial forces among the roller-cones after adjusting the at least one design parameter. Applicant respectfully contends that neither *Ma et al., Ma, Warren* nor Applicant's Own Admission, either alone or in combination, discloses, teaches, or suggests each of these limitations.

For example, the references relied upon by the Office Action do not disclose, teach, or suggest "determining an axial force on the roller-cones, based on the axial forces on the cutting elements, and angularly rotating the bit", and "comparing a distribution of axial forces among the roller-cones prior to the adjusting the at least one design parameter with a distribution of axial forces among the roller-cones after adjusting the at least one design parameter." For at least these reasons, Applicant respectfully contends that Claim 47 is patentably distinguishable from the references relied upon by the Office Action.

New Claims

Applicant respectfully contends that Claims 51-64 are patentably distinguishable from the references cited in the Office Action.

Claims 51-54 each depend, either directly or indirectly, from Claim 40 or Claim 47. Therefore, Applicant respectfully contends that Claims 51-54 are patentable for the same reasons discussed above with regard to Claim 40 or Claim 47.

Furthermore, each new claim includes limitations directed to simulating drilling, determining the axial force on each roller cone based upon the axial force acting on the cutting elements, adjusting at least one bit design parameter, and repeating the simulating. As discussed above with regard to Claims 40 and/or 47, the references relied upon by the Office Action do not disclose, teach or suggest each of these limitations.

Conclusions

Applicant has made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, and for other reasons clearly apparent, Applicant respectfully requests full allowance of all pending claims. Furthermore, Applicant respectfully requests that the Examiner declare an Interference between the present Application and the '116 Application. If the Examiner feels that a telephone conference or an interview would advance prosecution of the present Application in any manner, the undersigned attorney for Applicant stands ready to conduct such a conference at the convenience of the Examiner.

If the Examiner determines that at least one of the claims copied from the '116 Application is allowable, Applicant respectfully requests that the Examiner recommend an interference, in accordance with MPEP 2303, which states:

> If the applications each contain one claim drawn to the same patentable invention (37 CFR 1.601(n)), the Examiner proceeds to propose the interference . . ..

The fee of $770.00 is hereby enclosed to satisfy the RCE filing fee under 37 CFR 1.17(e) for large entity.

A Notification of Extension of Time for three (3) months (from June 1, 2004 to September 1, 2004) is hereby enclosed along with the extension fee of $950.00 under 37 CFR 1.17(a)(2) for large entity. A claims fee transmittal is hereby enclosed that calculates that no additional fees are needed with this Amendment.

Applicant believes no other fees are due. However, should there be a fee discrepancy, the Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-2148 of Baker Botts L.L.P.

Respectfully submitted,
BAKER BOTTS L.L.P.
Attorneys for Applicant

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Reg. No. 45,003

Date:_____

Customer Number: **031625**
Attorney Docket No.: 074263.0238

Appl. Ser. No.: 09/833,016
Filed: 04/10/04 - Inventor: CHEN
Attorney Docket No. 074263.0238

"Annotated Marked-Up Drawings"

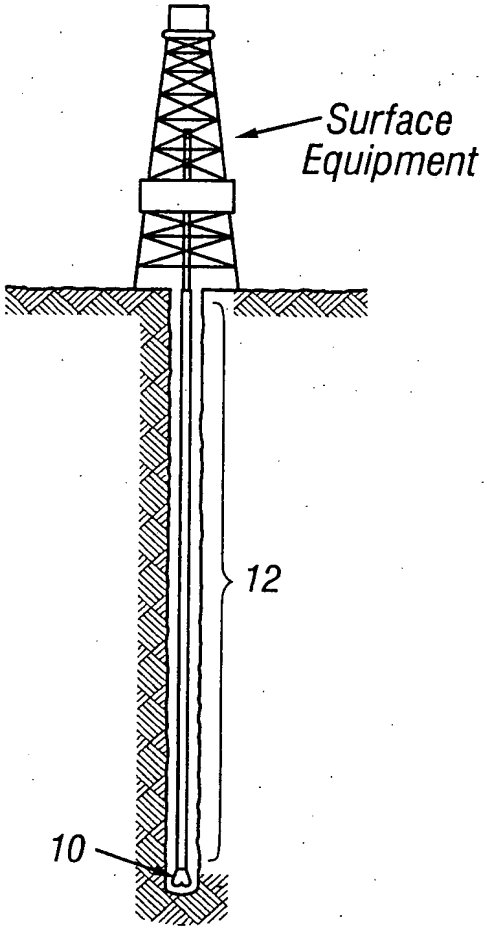

FIG. 10
(Prior Art)

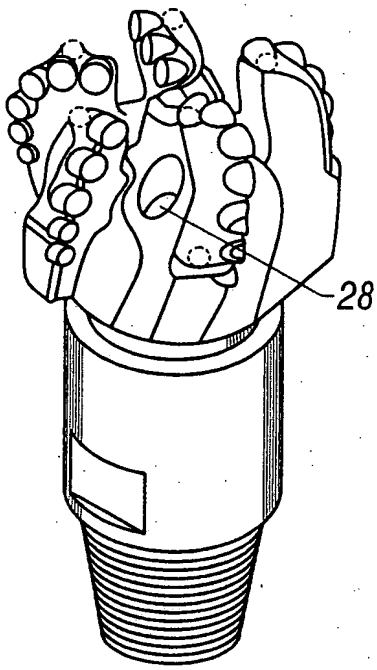

FIG. 11
(Prior Art)

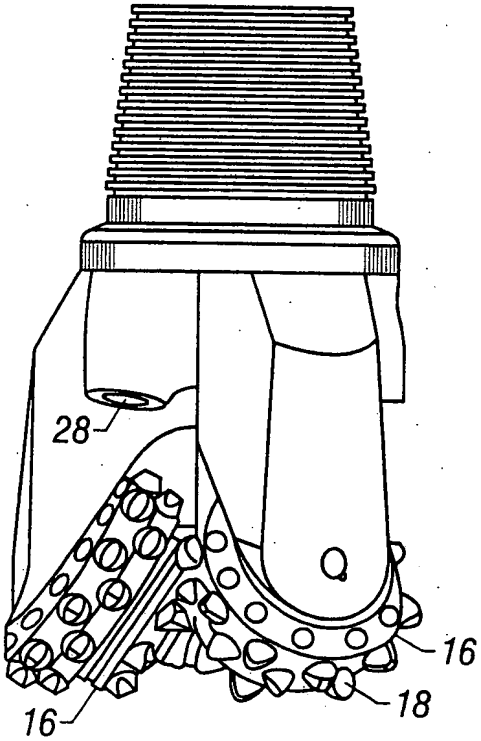

FIG. 12
(Prior Art)